

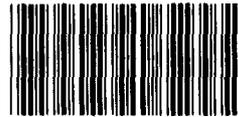
GAO

Report to the Chairman, Subcommittee
on Environment, Energy and Natural
Resources, Committee on Government
Operations, House of Representatives

April 1990

HAZARDOUS MATERIALS

DOD Should Eliminate DS2 From Its Inventory of Decontaminants



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National Security and
International Affairs Division

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April 25, 1990

The Honorable Mike Synar
Chairman, Subcommittee on Environment,
Energy and Natural Resources
Committee on Government Operations
House of Representatives

Dear Mr. Chairman:

This report responds to your request that we evaluate the Army's management and disposal of Decontamination Solution 2 (DS2). The report also provides information on the potential effects DS2 has on the readiness of weapon systems currently deployed and whether DS2 is being properly stored to prevent premature deterioration of containers.

As arranged with your office, unless you publicly announce its contents earlier, we plan no further distribution of this report until 30 days after its issue date. At that time we will send copies to the chairmen of other appropriate committees; the Secretaries of Defense, the Air Force, the Army, and the Navy; the Director, Office of Management and Budget; and other interested parties.

Please contact me at (202) 275-4268 if you or your staff have any questions concerning this report. Other major contributors to this report are listed in appendix III.

Sincerely yours,

A handwritten signature in cursive script that reads 'Nancy R. Kingsbury'.

Nancy R. Kingsbury
Director
Air Force Issues

Executive Summary

Purpose

The Department of Defense purchases Decontamination Solution 2 (DS2) for decontaminating equipment in the event of chemical warfare. This is the only stated use of DS2. The Army is the principal user of DS2.

The Chairman, Subcommittee on Environment, Energy and Natural Resources, House Committee on Government Operations, requested that GAO review the Army's management and disposal of DS2. Specifically, the Chairman asked GAO to address the following issues:

- how the use of DS2 can affect the readiness of certain currently deployed weapon systems,
- how the Army's efforts ensure that DS2 is stored properly,
- why the Army uses DS2 when the Air Force and the Navy use nonhazardous decontaminants, and
- how the Department of Defense's procedures ensure that surplus DS2 sold to the public is not used in a way that is harmful to humans or the environment.

Background

DS2 is incompatible with most metals. It corrodes aluminum, cadmium, tin, and zinc. It can damage metal, electronics, rubber sealants, fabrics, and plastics, which can affect the readiness of military equipment, such as tanks. DS2 is difficult to store and costly to dispose of. DS2 is also dangerous to humans, since it can cause severe burns; stricture of the esophagus; damage to the cornea of the eye, central nervous system, and liver; and adverse effects on human reproduction. It is not authorized for training due to its hazards.

The military services estimate that they have procured a total of about 5 million gallons of DS2 since the early 1960s. The Army has purchased the largest amount. From November 1986 to November 1988, the services requisitioned a total of 772,000 gallons of DS2. (DS2 procurement records earlier than November 1986 were not required to be retained.) Of this amount, the Army requisitioned about 666,000 gallons, or 86 percent; the Marine Corps requisitioned about 104,000 gallons, or about 13 percent; and the Air Force and the Navy requisitioned about 2,000 gallons, or less than 1/2 of 1 percent. The cost of DS2 varies from about \$14 to \$28 per gallon.

Results in Brief

Army units throughout the continental United States and overseas are purchasing large quantities of DS2, even though Army tests have shown that DS2 can damage current weapon systems, making them inoperable.

The Army's DS2 storage facilities did not conform to Department of Defense regulations, resulting in potential danger to humans and the environment.

The Army's tests have indicated that household bleaches were just as effective as DS2, and the Training and Doctrine Command has recommended that the Army replace DS2 with a less damaging decontaminant. Nevertheless, the Army continues to buy DS2, and its technical manual continues to instruct personnel to use it. Because of the many problems associated with DS2, the Air Force and the Navy are using effective, less toxic alternatives. The Air Force has selected hot, soapy water as its overall decontaminant, and the Navy has decided to use a hypochlorite (a bleaching agent) as its decontaminant for ships.

The Defense Logistics Agency, the responsible agency within the Department of Defense for selling excess property, told GAO it believed it had no authority to restrict or limit private entities or individuals from buying hazardous materials such as DS2. Once hazardous materials were sold, the agency did not ensure that the buyers were provided with information on how to use the materials properly. For example, the agency was selling DS2 to the general public without providing the Material Safety Data Sheet for DS2, which identifies health and environmental hazards associated with DS2. (Data sheets are available for all government-owned hazardous material.) Consequently, buyers were not being informed of the potential dangers of DS2 and of the safety precautions that need to be taken when using DS2, for example, wearing the protective equipment specified in the data sheets. However, on February 13, 1990, the Commander, Defense Reutilization and Marketing Service, Defense Logistics Agency, testified before the Subcommittee on Environment, Energy and Natural Resources, House Committee on Government Operations, that future sales of DS2 will be restricted to recyclers.

Principal Findings

DS2 Can Adversely Affect Weapons and Equipment

In April 1984 the Army conducted tests at the Dugway Proving Ground to determine the effects of DS2 on an M1 tank. The DS2 caused the rubber road wheels and tracks to become soft and decompose. DS2 also caused electronic cables to become extremely soft, and it actually ate through one cable. The DS2 also damaged the tank's periscopes. Any of these

damages can make a tank inoperable. Efforts to field equipment that can withstand the use of DS2 have only been marginally effective.

DS2 Storage Facilities Are Inadequate

Department of Defense regulations provide overall guidance for storage of various types of hazardous items. At the five Army facilities GAO visited in the United States, DS2 storage did not comply with the regulations. For example, deteriorating and leaking DS2 cans were stored in open-sided sheds, shipping containers, wall lockers, and buildings that do not conform to regulations, none of which meet the Department of Defense's hazardous material storage requirements. In addition, at one of the facilities GAO visited, DS2 was stored with supertropical bleach, a hypochlorite. Supertropical bleach is also a standard decontaminant; however, when it comes in contact with DS2 it can ignite and explode. GAO also visited a Marine Corps facility in the United States that had over 20,000 gallons of DS2 that was being stored in facilities that do not conform with regulations.

At the Army facilities GAO visited in Europe, DS2 was stored outside, which violates Army guidance. For example, at one facility cans containing DS2 were stored in an open shed with no walls. When cans containing DS2 are exposed to temperature changes, rain, and snow, they corrode and leak, causing potential dangers to humans and the environment.

DS2 Sales Pose Potential Dangers to the Public

The Defense Logistics Agency was selling DS2 to the general public without providing information on the potential dangers of DS2 and the safety precautions that need to be taken when using DS2. According to the agency, no regulation requires that it provide buyers with specific warnings of the dangers of DS2. In 1988 the agency established procedures that required its Defense Reutilization and Marketing Offices to provide buyers, upon request, with the Material Safety Data Sheet for the hazardous material being purchased. However, these data sheets were not routinely provided. GAO contacted four individuals who purchased DS2, and they indicated that they had not received the data sheet for DS2. One individual GAO interviewed was unaware of the hazards associated with DS2 and had used 50 gallons of DS2 to clean metal parts and metal drums without using a respirator, which is required of Department of Defense personnel using the solution. The Defense Logistics Agency has recently stated that it will restrict future sales of DS2 to recyclers.

GAO sent a letter to the Secretary of the Army on June 7, 1989, which identified matters that GAO believed warranted the Secretary's immediate attention. (See app. II.) GAO did not receive a response to the letter.

Recommendations

GAO recommends that the Secretary of Defense

- direct the Army and the Marine Corps to use a substitute for DS2 and all services to eliminate DS2 from their inventory of decontaminants and
- direct the Director, Defense Logistics Agency, to ensure that DS2 is not available to the general public and that DS2 sales are restricted to recyclers.

Agency Comments

As requested, GAO did not obtain written agency comments on this report. However, GAO discussed a draft of this report with Department of Defense officials and incorporated their comments where appropriate.

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Abbreviations

DOD	Department of Defense
DS2	Decontamination Solution 2
GAO	General Accounting Office

Introduction

In the event of chemical warfare, military equipment will need to be decontaminated. Consequently, military units and depots throughout the continental United States and overseas store decontaminants for this purpose. One of the two standard decontaminants is Decontamination Solution 2 (DS2). This is DS2's only stated military use. The Army Armament, Munitions, and Chemical Command manages the services' DS2 supply. Supertropical bleach, a hypochlorite (a bleaching agent) is the other standard decontaminant.

DS2 poses many health and environmental problems and must be handled with extreme caution. DS2 has many adverse effects: it is toxic and highly corrosive and can cause severe chemical burns; stricture of the esophagus; damage to the liver, the cornea of the eye, and the central nervous system; and, according to the National Institute for Occupational Safety and Health, adverse reproductive effects in humans. In addition, DS2 is combustible and will ignite on contact with such materials as supertropical bleach.

Before 1988 the Defense Logistics Agency had been selling surplus DS2 to the public but had not provided buyers with specific warnings of the dangers of DS2. According to Defense Logistics Agency officials, no regulation requires it to provide such information. In 1988 the Defense Logistics Agency required the Defense Reutilization and Marketing Office to furnish a copy of the Material Safety Data Sheet¹ for DS2 to the buyer upon request. If the data sheet was requested and not available, the marketing office was not required to obtain a copy for the buyer.

The Material Safety Data Sheet for DS2, dated September 28, 1984, identifies health hazards, handling and storing precautions, and transportation requirements. It states that protective rubber gloves, rubber boots, a rubber apron, and a respirator or a self-contained breathing apparatus should be worn when using DS2. The Department of Defense recognizes that rubber protective gear can decompose when it comes in contact with DS2. At the time of our review, the Department of Defense was working on developing a substitute for the rubber items, since using DS2 without proper protective clothing could result in serious physical harm.

The Material Safety Data Sheet also states that DS2 is incompatible with most metals. It corrodes aluminum, cadmium, tin, and zinc. It is also

¹ A Material Safety Data Sheet is prepared for all government-owned hazardous materials. It identifies the material's ingredients; hazards; handling, storage, transportation, and disposal requirements; and personal safety requirements, such as clothing or other protective gear.

destructive to plastics, aircraft canopies, protective masks, crash helmets, and optics; softens rubber components; and dissolves lubricants. Some military equipment is extremely vulnerable to damage when decontaminated with DS2. DS2 cannot be used on ammunition, since it removes the critical markings and may corrode the ammunition, making it unusable. The Army acknowledges that DS2 is so dangerous it is not used in training because elaborate safety and environmental precautions are required.

The military services estimate that they have procured a total of about 5 million gallons of DS2 since the early 1960s.² The Army has purchased the largest amount. During the period from November 1986 through November 1988, the services requisitioned 772,000 gallons of DS2. Of this amount, the Army requisitioned about 666,000 gallons, or 86 percent; the Marine Corps requisitioned about 104,000 gallons, or about 13 percent; and the Air Force and the Navy requisitioned about 2,000 gallons, or less than 1/2 of 1 percent. The current cost of DS2 varies from about \$14 to \$28 per gallon depending on the size of the container.

The Army requisitions DS2 for contingency purposes and stores it in depots and at installations throughout the continental United States and overseas. Army officials stated that DS2 is disposed of when the containers deteriorate and leak or when the DS2 becomes excess to a unit's requirements. The Defense Logistics Agency through the Defense Reutilization and Marketing Offices, disposes of DS2 for the services by selling it or contracting for its disposal. Contractors who dispose of DS2 are required to adhere to state disposal regulations pertaining to the disposal of hazardous waste.

Objectives, Scope, and Methodology

In an October 21, 1988, letter, the Chairman, Subcommittee on Environment, Energy and Natural Resources, House Committee on Government Operations, requested that we review the Army's management and disposal of DS2. Specifically, the Chairman asked us to review the following issues:

- how the use of DS2 can affect the readiness of certain currently deployed weapon systems,
- how the Army's efforts ensure that DS2 is stored properly,

²DS2 procurement records earlier than November 1986 were not required to be retained.

- why the Army uses DS2 when the Air Force and the Navy use nonhazardous decontaminants, and
- how the Department of Defense's procedures ensure that surplus DS2 sold to the public is not used in a way that is harmful to humans or the environment.

We interviewed and obtained documents on the services' policies and procedures for the acquisition and management of DS2 from Air Force, Army, Marine Corps, and Navy officials at their respective headquarters. We also interviewed officials at Headquarters, U.S. Army, Europe, regarding the management of DS2 in Europe. We obtained various Department of Defense, service, and installation documents governing DS2, such as regulations, technical reports, and procurement contracts.

Since the Army is the predominant purchaser of DS2, we focused our review on its requirements for managing, procuring, and requisitioning DS2. We interviewed officials and reviewed records at the Army Materiel Command; Armaments, Munitions, and Chemical Command; Training and Doctrine Command; and Forces Command. We met with officials of the Army's Depot System Command, which provides centralized management for Army supply depots worldwide, to discuss storage requirements and obtain regulations on how DS2 should be stored. We also met with officials at the Army Corps of Engineers, which designs and constructs storage facilities, to obtain information on the proper storage of DS2. We interviewed officials at the Defense Reutilization and Marketing Service and at five Defense Reutilization and Marketing Offices to determine procedures for disposing of DS2 by resale or through commercial disposal contractors.

In the United States we visited three Army installations, one Army depot, and one Marine Corps installation to observe how DS2 is stored. In Europe we met with officials from the 200th Theater Army Materiel Management Center to discuss the management of DS2 as part of European theater war reserves. We reviewed the management of DS2 in the 21st Theater Area Army Command and visited three reserve storage activities, which are operated by the 21st Theater Area Army Command. We visited the 29th and 47th Area Support Groups to determine if the U.S. Army in Europe is managing DS2 in accordance with regulations and discuss efforts to prevent DS2 container deterioration. We reviewed the sale of about 165,000 gallons of DS2 in Europe through the Defense Reutilization and Marketing Region in Europe and its marketing office.

We discussed the characteristics of DS2 and the Army's efforts to develop a replacement for DS2 with officials of the Chemical Research, Development, and Engineering Center, and the Army Chemical School. We interviewed officials at the Dugway Proving Ground to obtain test results on the effectiveness of DS2 and its effect on the readiness of weapon systems. We contacted Environmental Protection Agency officials to identify laws and regulations applicable to the storage, handling, and disposal of DS2. (See app. I for a complete list of the organizations we contacted.) We also contacted four individuals who had purchased DS2 from the Defense Reutilization and Marketing Office.

We conducted our review from November 1988 to February 1990 in accordance with generally accepted government auditing standards. As requested, we did not obtain written agency comments on this report. However, we discussed a draft of this report with Department of Defense officials and incorporated their comments where appropriate.

DS2 Damages Weapons and Equipment

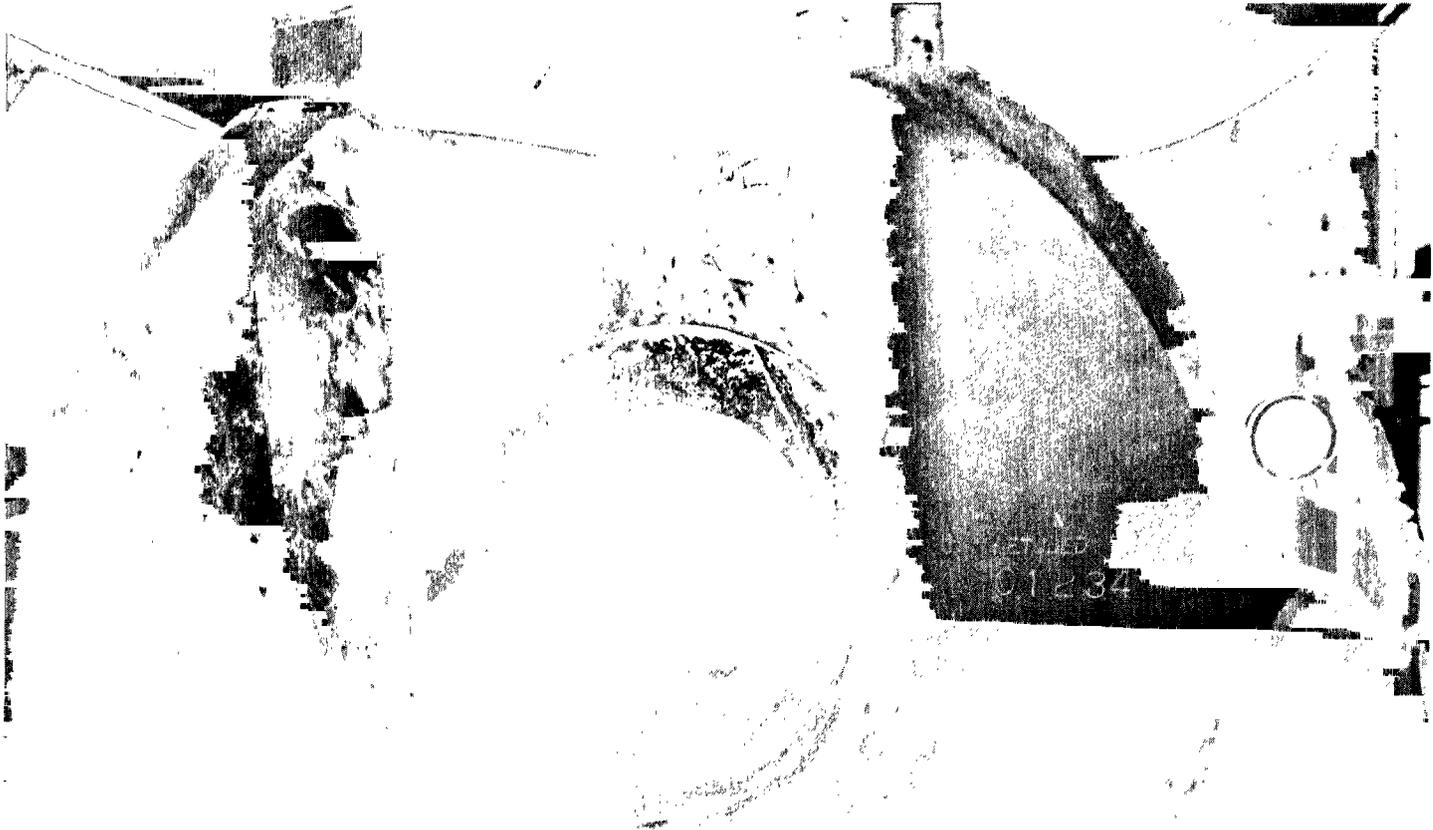
Tests have shown that DS2 can severely damage some of the Army's equipment, including major weapon systems such as the M1 tank. For example, DS2 can cause the M1 tank's electronics and optical equipment to become inoperable. DS2 also can corrode and remove the markings from ammunition, and may render it useless. According to the Commander, Training and Doctrine Command, efforts to field equipment that can withstand the use of DS2 have only been marginally effective.

In July 1989 the Training and Doctrine Command recommended that the Army replace DS2 with a less damaging decontaminant. The Commander of the Training and Doctrine Command stated that program managers should not be expending scarce resources to design equipment that can withstand DS2 use. The commander said that program managers should focus on replacing DS2 with a less damaging decontaminant.

DS2 Adversely Affects Weapons and Ammunition

The Army conducted tests on an M1 tank at the Dugway Proving Ground in April 1984, which showed that the effects of DS2 could make the tank inoperable. The tests showed that DS2 severely damaged electrical components and cables and could potentially affect some metal components. DS2 caused the rubber road wheels and track of the tank to decompose and damaged the tank's periscopes. When DS2 was used on the interior surface of the tank, internal electronic cables became soft, and one cable started smoking within 30 minutes as the DS2 ate through it. The Training and Doctrine Command concluded that DS2 should not be used on the tank's interior. Figures 2.1 and 2.2 show the damages caused by DS2 to the M1 tank.

Figure 2.1: Damage to the Interior of an M1 Tank



Source: Army

Figure 2.2: Damage to the Electrical Components of an M1 Tank



Source: Army

In addition, the tests determined that household bleach was as effective as DS2 for decontaminating the interior of the tank. The tank was decontaminated 12 times with bleach, and it remained operational and its electrical components were not damaged.

The Training and Doctrine Command system manager for the M1 tank recommended to the Commander of the Army Armor Center that household bleach be used instead of DS2 as a decontaminant for the tank's interior. However, the Director, Physical Protection, Chemical Research, Development and Engineering Center, considered bleach to be corrosive and recommended that the Army continue to use DS2. (The Director did not address the storing and handling requirements of DS2.) The Director was concerned that household bleach had a short shelf life and caused metal cans to deteriorate. Bleach is a common item that can be used for many purposes before its shelf life expires and is normally packaged in plastic containers. The Army technical manual for the M1 tank continues to instruct operators to use DS2 as a decontaminant for the tank's interior.

Alternatives to DS2 Are Available

Tests have shown that alternative decontaminants, such as hypochlorites, are effective and less harmful to the Army's equipment. According to a technical analyst at the Dugway Proving Ground, the use of an alternative decontaminant would not affect the military's ability to respond to chemical warfare.

The Dugway Proving Ground issued a technical report³ that identified decontaminants that were as effective as DS2 but not as hazardous to use. For example, the report indicated that in one test the effectiveness of DS2 was compared with the effectiveness of other decontaminants, such as commercial liquid detergent, soil, diesel fuel, jet fuel, and ethylene glycol (antifreeze). These decontaminants were used against nerve and blister agents and the effectiveness of each was measured by the percent of the agent remaining after decontamination. DS2 was not shown to be the best decontaminant in any of the tests conducted.

The EAI Corporation issued a technical report⁴ for the Dugway Proving Ground that focused on commercially available materials that could be used as decontaminants. The report stated that, in the event of a chemical war, the demand for decontaminants, such as DS2, would be so great that the use of other decontaminants would be needed. The report rated hypochlorites as one of the most effective alternatives to DS2 because of their low cost, easy use, fast action, and potency against potential chemical warfare agents.

³Effectiveness of U.S. Standard and Nonstandard Decontaminants and Decontamination Efficiency, May 1987.

⁴Commercial and Field Expedient Chemical Warfare Agent Decontaminants, February 1988.

Because of the adverse effects of DS2 on equipment and the problems associated with its use and storage, the Air Force and the Navy have adopted alternative decontaminants. According to the Associate Director of Maintenance and Supply at Air Force Headquarters, the Air Force is eliminating DS2 from its inventory and plans to use hot, soapy water because it is the most readily available decontaminant to remove chemical warfare agents on aircraft, airfields, and equipment. According to the Acting Deputy Assistant Chief of Naval Operations for Surface Warfare, the Navy will use a hypochlorite as its decontaminant in the event of chemical warfare, since DS2 is not used on ships because of its corrosiveness and toxicity. The chief stated that this water-soluble material is stable and that when stored, handled, and prepared properly, it will not damage equipment or pose any danger to personnel.

Army Management of DS2 Is Inadequate

The Army does not have enough storage facilities to properly store all of its hazardous materials, including DS2, and many of its facilities do not conform to Department of Defense regulations. Large quantities of DS2 are being stored at Army depots in warehouses that do not conform to hazardous material storage requirements and are currently in violation of numerous regulations. In the United States, DS2 is being stored in open-sided sheds, wall lockers, shipping containers, and buildings that do not conform to hazardous material storage requirements. In Europe, DS2 is being stored under conditions that violate Army regulations, such as in an open shed with no walls. As a result, DS2 containers are deteriorating and causing potential threats to humans and the environment. Our discussions with officials at the Army Depot Command revealed that the lack of proper storage facilities for hazardous items is a world-wide problem.

DS2 Storage Violates Regulations and Presents Potential Safety Hazards

Department of Defense Regulation 4145.19-R-1 provides the overall guidance for the storage and handling of various types of hazardous items. According to this regulation, DS2 is to be kept in a single-purpose structure of noncombustible or fire-resistant construction, divided into individual compartments or stock rooms not to exceed 20,000 square feet. The structure must contain automatic sprinklers that discharge 1/2 gallon of water per minute per square foot of floor space, specified low-level ventilation, and suitable floor drains or wall scuppers to expedite the drainage of water discharged from sprinklers and hoses. In addition, Army Supply Bulletin 740-94-2 states that cans of DS2 must be protected from temperature extremes and should not be stored near acids or oxidizing agents.

Storage in the United States Violates Regulations

All five of the Army facilities we visited in the United States stored DS2 improperly. The DS2 was stored in open-sided sheds, shipping containers, wall lockers, or buildings that do not conform to regulations, none of which meet the Department of Defense's requirements for hazardous material storage. In addition, we found deteriorating and leaking cans at every installation and depot we visited. Some of our findings are listed below, and figures 3.1 and 3.2 show DS2 cans in storage.

- At Fort Sill, Oklahoma, four units in one battalion had leaking DS2 cans, and one unit had stored DS2 with supertropical bleach. DS2 can ignite on contact with supertropical bleach and an explosion may result.
- At Fort Lewis, Washington, one battalion was storing cans of DS2 in a shed without walls, exposing them to weather elements. Some of the

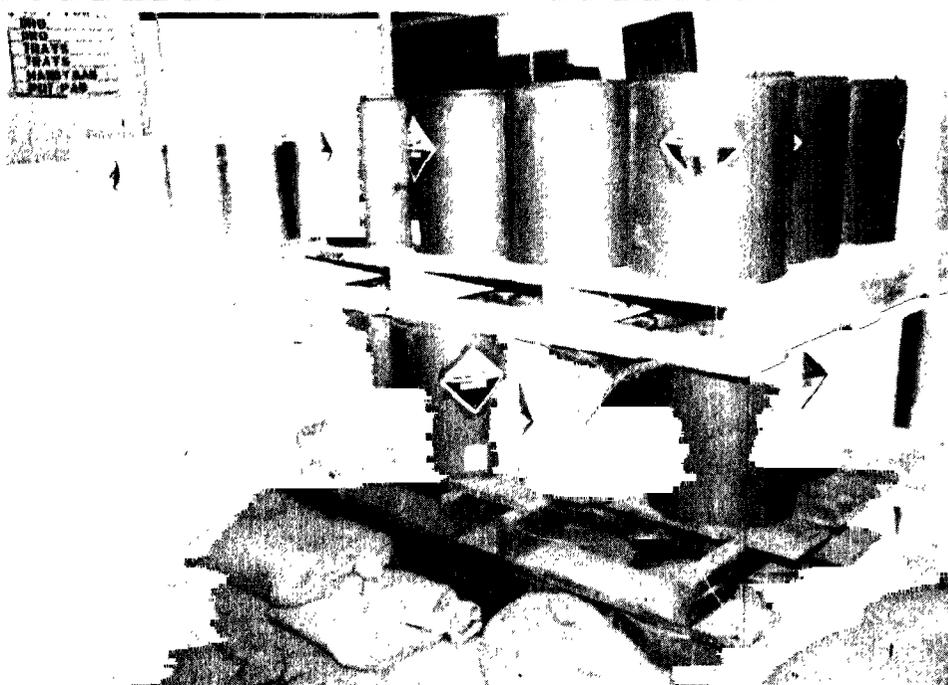
cans were wrapped in plastic, which caused moisture to condense, and could hasten the deterioration of the cans. Some of the units were also storing DS2 in buildings that did not conform to Department of Defense regulations for storing hazardous materials.

- At Fort Hood, Texas, 1,383 1-1/3-quart cans and 57 5-gallon cans of DS2 were found to be leaking. The III Corps Chemical Officer stated, in a June 8, 1989, memorandum to the Commander of III Corps, that proper facilities for DS2 storage were not available. The officer also stated that DS2 storage at Fort Hood during peacetime is unnecessary.

Figure 3.1: Deteriorating DS2 Cans in the United States



Figure 3.2: DS2 Stored in a Building Not Conforming to Regulations



In April 1989 a feasibility study, conducted by the Foster Wheeler USA Corporation for the Depot Systems Command, assessed the hazardous material storage facilities at Army depots worldwide. The results showed that adequate hazardous material storage facilities for DS2 were not available. According to the report, hazardous material storage conditions were grossly nonconforming and in violation of numerous Environmental Protection Agency, National Fire Protection Act, Occupational Safety and Health Administration, and Department of Defense regulations.

We also visited the DS2 storage facilities at the Marine Corps Logistics Base, Albany, Georgia. We found that over 20,000 gallons of DS2 were stored in facilities that did not comply with Department of Defense regulations for the hazardous material storage.

Inadequate Storage in Europe Increases Deterioration of Cans

The Army depots we visited in Europe stored DS2 under conditions that violate Army directives regarding DS2 storage in both outside and indoor facilities. At Germersheim, West Germany, DS2 cans were stored in a structure with a roof but no walls, thus exposing the cans to weather elements, such as temperature changes, rain, and snow. This was in violation of a 1978 memorandum issued by the 21st Theater Area Army

Command, which stated that DS2 must be stored in a manner that prevents the deterioration of cans from exposure to weather elements. It was also in violation of a 1982 letter issued by the Armament, Munitions, and Chemical Command, which stated that to prevent can deterioration, DS2 should not be stored in a damp, humid environment. According to a March 1988 Army Materiel Command report, most of the corrosion to DS2 cans at Germersheim occurred during the summer when changes in temperature caused the metal cans to sweat.

At the three reserve storage activities we visited, the DS2 storage facilities did not meet regulations for storage facilities in the United States and additional safety requirements of the host nations. For example, the National Fire Protection and the Armament, Munitions, and Chemical Command requirements specify that no more than 27,500 gallons be stored in any one indoor facility. However, the reserve storage activity at Kaiserslautern, West Germany was storing about 189,000 gallons, and the reserve storage activity at Burtonwood, England, was storing about 201,000 gallons. In addition, some pallets of DS2 cans were stacked higher than allowed by regulations (see fig. 3.3), with little or no aisle space. This increased the likelihood of a spill, and adequate containment was not available. Further compounding this problem was the fact that deteriorated cans were in danger of leaking (see fig. 3.4).

Figure 3.3: DS2 Cans Stored on Pallets in Europe

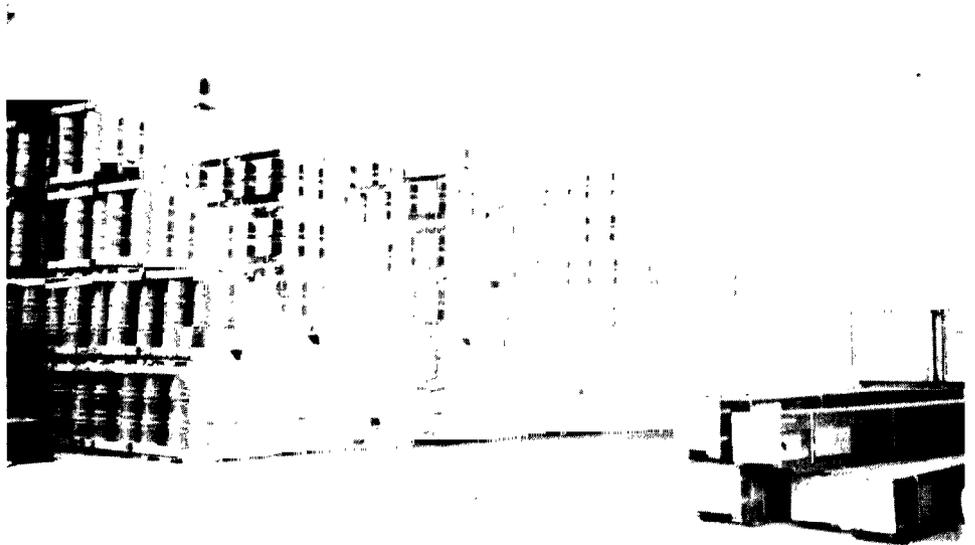


Figure 3.4: Deteriorating DS2 Cans
in Europe



DS2 Sales to the Public Pose Potential Dangers

The Defense Logistics Agency has been selling DS2 to the general public without providing information on the potential dangers of DS2 and the safety precautions that need to be taken when using DS2. According to the agency, no regulation requires that it provide buyers with specific warnings of the dangers of DS2. In 1988 the agency established procedures that required its Defense Reutilization and Marketing Offices to provide buyers, upon request, with the Material Safety Data Sheet for the hazardous material being purchased. However, these data sheets were not routinely provided. On February 13, 1990, the Commander, Defense Reutilization and Marketing Service, Defense Logistics Agency, testified before the Subcommittee on Environment, Energy and Natural Resources, House Committee on Government Operations, that future sales of DS2 will be restricted to recyclers.

DS2 is made exclusively for the Department of Defense according to military specifications. DS2's only stated military use is as a decontaminant. Our review did not identify any special commercial uses for DS2, yet excess DS2 was being sold to the general public, and the buyers were not being warned of its potential dangers.

Our review of DS2 sales in the United States and Europe showed that from October 3, 1985, through September 30, 1988, about 170,000 gallons were sold. Examples of sales in the United States follow.

- On September 11, 1986, Defense Logistics Agency officials at Fort Sill, Oklahoma, sold 42 1-1/3-quart cans and 6 5-gallon cans of DS2 to an individual who operated a surplus store in Oklahoma. The buyer told us he was not given a Material Safety Data Sheet or told of the hazards of DS2. The buyer also said that he had not sold any of the DS2 and that the DS2 was stored in a corner of his store.
- On June 28, 1988, Defense Logistics Agency officials at Kirtland Air Force Base, New Mexico, sold 10 5-gallon cans to an individual. The buyer told us he had used all of the DS2 to clean metal parts and metal drums. The buyer stated that he did not remember receiving the data sheet and that he did not use a respirator or a self-contained breathing device when he used the DS2.
- An individual purchased 37 5-gallon cans and 274 1-1/3-quart cans, or about 275 gallons of DS2, at Kirtland Air Force Base. The buyer said that he did not know what he was buying and that Defense Logistics Agency officials did not provide him with the data sheet. The buyer also told us that when he went to the Defense Logistics Agency to pick up the DS2, he told agency personnel that he did not want to accept the DS2 because he believed it might be dangerous. However, the agency personnel told him that if he did not take the DS2, they would remove his name from the bidder's list and he would be barred from bidding at future auctions. The buyer further stated that two of the cans were leaking when he picked them up and that the cans, which he stored at home, later started fuming and had to be watered down. He later gave all of the DS2 to another individual who, according to the buyer, intended to use it to kill weeds.
- On August 17, 1988, an individual bought 43 5-gallon cans of DS2 from the Mountain Home Air Force Base, Idaho. The buyer told us he believed he was buying an alkaline substance that could be mixed with water and used as a degreaser. Once he realized the hazards of using DS2, he returned it to the Defense Logistics Agency unused. The chief of the local Defense Logistics Agency office did not know how the buyer intended to use the DS2, and both the chief and the environmental specialist told us that they were not aware of the hazards of DS2 to humans or the environment. According to the chief, the data sheet for DS2 was not available.

Conclusions

Our observations at several Army installations, discussions with Army Depot Command officials, and the April 1989 report for the Depot Systems Command indicate that the Army does not have adequate storage facilities to store DS2 safely and that the Defense Logistics Agency was not providing adequate safeguards to the public when selling DS2. DS2 presents major health risks to individuals who are not aware of its effects on their health and on the environment. We believe the Army should stop buying DS2 and dispose of its DS2 inventory as quickly and as safely as possible. Suitable alternatives to DS2 are available. The Defense Logistics Agency also should not sell DS2 to the general public.

We agree with the newly adopted Defense Logistics Agency policy to restrict sales of DS2 to recyclers. However, the agency needs to monitor DS2 sales, especially if the large quantities in the current inventory are offered for sale, to ensure the material is not made available to the general public.

Recommendations

We recommend that the Secretary of Defense

- direct the Army and the Marine Corps to use a substitute for DS2 and all services to eliminate DS2 from their inventory of decontaminants and
- direct the Director, Defense Logistics Agency, to ensure that DS2 is not available to the general public and that DS2 sales are restricted to recyclers.

Organizations Contacted

Air Force

- Headquarters, Department of the Air Force, Washington, D.C.

Army

- Headquarters, Department of the Army, Washington, D.C.
- Headquarters, Army Materiel Command, Alexandria, Virginia
- Armament, Munitions, and Chemical Command, Rock Island, Illinois
- Depot System Command, Chambersburg, Pennsylvania
- Seneca Army Depot, Romulus, New York
- Headquarters, Training and Doctrine Command, Fort Monroe, Virginia
- Army Chemical Research, Development, and Engineering Center, Aberdeen Proving Ground, Maryland
- Army Chemical School, Fort McClellan, Alabama
- Headquarters, Dugway Proving Ground, Utah
- Headquarters, Forces Command, Fort McPherson, Georgia
- Headquarters, I Corps and Fort Lewis, Washington
- Headquarters, III Corps and Fort Hood, Texas
- Headquarters, 5th Army and Fort Sam Houston, Texas
- Army Field Artillery Center and Fort Sill, Oklahoma
- Corps of Engineers, Dallas, Texas
- National Guard Bureau, Washington, D.C.
- National Guard of Idaho, Boise, Idaho
- Army National Guard, Camp Ripley, Minnesota
- Headquarters, 49th Armored Division, Texas National Guard, Austin, Texas
- Headquarters, U.S. Army, Europe
 - 200th Theater Army Material Management Center, Zweibrucken Germany
 - 21st Theater Army Area Command, Kaiserslautern, Germany
 - Reserve Storage Activity, Kaiserslautern, Germany
 - Reserve Storage Activity, Germersheim, Germany
 - Reserve Storage Activity, Burtonwood, England
 - 29th Area Support Group, Kaiserslautern, Germany
 - 47th Area Support Group, Burtonwood, England

Marines

- Headquarters, Marine Corps, Rosslyn, Virginia
- Marine Corps Logistics Base, Albany, Georgia

Navy

- Office of the Chief of Naval Operations, Department of the Navy, Washington, D.C.
- Naval Facilities Engineering Command, Alexandria, Virginia

Other Federal Agencies

- Defense Reutilization and Marketing Service, Battle Creek, Michigan
- Defense Reutilization and Marketing Office, Marine Corps Logistics Base, Albany, Georgia
- Defense Reutilization and Marketing Office, Fort Hood, Texas
- Defense Reutilization and Marketing Office, Hill Air Force Base, Utah
- Defense Reutilization and Marketing Office, Fort Sill, Oklahoma
- Defense Reutilization and Marketing Region in Europe, Lindsay Air Station, Wiesbaden, Germany
- Defense Reutilization and Marketing Office, Kaiserslautern, Germany
- Environmental Protection Agency, Region VI, Dallas, Texas

State Agencies

- Department of Health and Environment, State of Tennessee, Chattanooga, Tennessee
- Texas Water Commission, State of Texas, Deer Park, Texas

Private Industry

- Poly Research Corporation, Holtsville, New York
- EMPAK, Inc., Deer Park, Texas
- GSX Government Services, Inc., Athens, Tennessee

GAO's Letter to the Secretary of the Army

GAO

United States
General Accounting Office
Washington, D.C. 20548

National Security and
International Affairs Division

B-213706

June 7, 1989

The Honorable John O. Marsh
The Secretary of Army

Dear Mr. Secretary:

We are reviewing the Department of Defense's management, storage, and disposal of Decontamination Solution 2 (DS2)--a toxic material used by the military services for decontaminating equipment exposed to chemical warfare agents. The review is being performed under job code 392435. Our review is not yet completed, but we have identified the following matters which we believe warrant your immediate attention.

- Active components, reserve, and national guard units are obtaining DS2, even though some are not authorized to have it and no units are allowed to use it for training purposes.
- Large quantities of DS2 are therefore excess while additional quantities are being procured.
- Acquisition of DS2 creates storage and disposal problems due to the hazardous nature of this item.
- Serviceable DS2 is being disposed of at the same time as it is being procured.

The Army Materiel Command is the lead agency for chemical, biological, and radiological defensive materiel, including DS2. The Army Materiel Command's major subordinate command, the Armament, Munitions and Chemical Command, Rock Island, Illinois, procures and manages DS2 for all the services. The Defense Reutilization and Marketing Service, through its Defense Reutilization and Marketing Offices, is responsible for the disposal of excess or unserviceable DS2.

Of the DS2 that is being acquired, about 93 percent is for Army use and about 7 percent for the Marine Corps use. During the past 2 years the services have acquired more than 770,000 gallons of DS2. Also, the Armament, Munitions, and

Chemical Command currently has procurement actions (contracts or contracts pending) for 1.4 million gallons of DS2 at a cost of about \$46.4 million.

Our work at the Armament, Munitions, and Chemical Command showed that DS2 is being purchased and shipped to active components, reserve, and guard units throughout the continental United States even though regulations state that some of these units should not be receiving DS2.

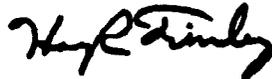
During our review we also found that units are turning in serviceable DS2 for disposal at the same time new DS2 is being purchased. Furthermore, we were provided information showing that active components, reserve, and guard units are requesting disposition instructions for large quantities of DS2 for turn in to the Army depots. For example, Fort Carson, Colorado, recently requested disposition instructions for 11,158 1-1/3-quart cans and 387 5-gallon cans because they had no need for the DS2 and also did not have adequate storage facilities.

We believe that the disposal of serviceable DS2 and the procurement and delivery of DS2 should be discontinued until the Army determines the quantities that should be reported as excess by the units that should not have it. In addition, units that have excess DS2 in serviceable condition should make it available to the item manager to fill outstanding requisitions for those units that are authorized to have it.

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We appreciate the cooperation and courtesies being extended to our representatives during this ongoing review. If you have any questions, please contact George J. Wooditch, Assistant Director, on 275-4262 or Jacob W. Sprouse, Jr., Audit Manager, on 275-4285.

Sincerely yours,



Harry R. Finley
Director, Air Force Issues

Major Contributors to This Report

**National Security and
International Affairs
Division, Washington,
D.C.**

Norman J. Rabkin, Associate Director
George J. Wooditch, Assistant Director
Jacob W. Sprouse, Assignment Manager

Dallas Regional Office

Thomas F. Ward, Evaluator-in-Charge
Bettye J. Caton, Site Senior
Roy G. Buchanan, Evaluator
Ha Vo Nguyen, Evaluator

European Office

Stephen L. Caldwell, Site Senior

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